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AEROMEDICAL EVACUATION: VALIDATING CIVIL RESERVE AIR FLEET

BY

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Damon K. Gooch

LIST OF ILLUSTRATIONS

LIST OF ACRONYMS

A3BC commercial aircraft division

ACCE air component coordination element

AE aeromedical evacuation

AEC aeromedical evacuation crew

AECT aeromedical evaluation control team

AED air expeditionary detachment

AES aeromedical evacuation squadron

AESC aeromedical evacuation support cell

AESS aeromedical evacuation ship set

AF Air Force (component level)

AFDD Air Force doctrine document

AFPD Air Force policy directive

AFRC Air Force Reserve Command

AFTTP Air Force tactics, techniques, and procedures

AMC Air Mobility Command

ANG air national guard

AOR area of responsibility

APOD aerial port of debarkation

APOE aerial port of embarkation

AR Army Reserve

ARC Air Reserve Component

ATC air traffic control

AWC Army War College

CCATT critical care air transport team

CDRUSCENTCOM Commander, United States Central Command

CDRUSTRANSCOM Commander, United States Transportation Command

CJCS Chairman, Joint Chiefs of Staff

CLR Council for Logistics Review

COA course of action

COCOM combatant command

CONOPS concept of operations

CONPLAN contingency plan

CONUS continental United States

CRAF Civil Reserve Air Fleet

CRP Civilian Research Project

DCO defense coordinating officer

DEPORD deployment order

DT&E developmental test and evaluation

DHS Department of Homeland Security

DIRLAUTH direct liaison authorized

DoD Department of Defense

DSCA defense support of civil authorities

DTS defense transportation system

FAA Federal Aviation Administration

FAAR facilitated after action report

FE flight engineer

FEMA Federal Emergency Management Agency

FTX field training exercise

GPMRC Global Patient Movement Requirements Center

GTN Global Transportation Network

GWOT Global War on Terrorism

HDPLP High Deck Patient Lift Platform

HLS homeland security

IAT University of Texas Institute for Advanced Technology

ICMOP Integrated CONUS Medical Operations Plan (ICMOP)

IDA Institute for Defense Analysis

ITV in-transit visibility

JCS Joint Chiefs of Staff

JOPES Joint Operations Planning and Execution System

JP joint publication

JRMPO joint regional medical planning office

JMAT Joint Medical Analysis Tool

JSCP Joint Strategic Capabilities Plan

LG Logistics

LSAS litter station augment set

MAT Medical Analysis Tool

MAF Mobility Air Force

MCS mission capabilities study

MEDEVAC medical evacuation

MRS-05 Mobility Requirements Study 2005

MTW major theater war

MVP mobilization value points

NAP National Airlift Plan

NCA National Command Authority

NDAA National Defense Authorization Act

NLE national level exercise

NMS National Military Strategy

NRF National Response Framework

OBOGS onboard oxygen generating system

OCONUS outside the continental United States

ODS/S Operation Desert Shield/Storm

OE operational environment

OEF Operation ENDURING FREEDOM

OIF Operation IRAQI FREEDOM

OPCON operational control

OT&E operational test and evaluation

OPLAN operation plan

OPORD operation order

PM patient movement

POM program objective memorandum

PSP patient support pallet

QDR Quadrennial Defense Review

ROE rules of engagement

RSO&I reception, staging, on-ward movement, and integration

SAFB Scott Air Force Base

SECDEF Secretary of Defense

SG Surgeon

SON statement of need

SOW statement of work

SSCF Senior Service College Fellowship

STC supplemental type certification

TACC tanker airlift control center

TBD to be determined

TRAC2ES TRANSCOM Regulating Aeromedical Command and Control Evacuation System

US United States

TTP tactics, techniques, and procedures

USAF United States Air Force (refers to service)

USNORTHCOM United States Northern Command

USPACOM United States Pacific Command

USTRANSCOM United States Transportation Command

UT University of Texas at Austin

AEROMEDICAL EVACUATION: VALIDATING CIVIL RESERVE AIR FLEET

Introduction and Background

> *The leading idea, which should be constantly kept in view, is to strengthen the hands of the Commanding General by keeping his army in the most vigorous health, thus rendering it, in the highest degree, efficient for enduring fatigue and privation, and for fighting. In this view [medical evacuations] are of vital importance to the success of an army, and commanders seldom appreciate the full effect of their proper fulfillment.*
>
> *—Major Jonathon Letterman*
> Medical Director of the Civil War
> Army of the Potomac

> *Pay every attention to the sick and wounded. Sacrifice your baggage, everything for them. Let the wagons be devoted to their use, and if necessary your own saddles.*
>
> *—Napoleon I*

The strategic importance of aeromedical evacuation (AE) dates back some 80 years; CRAF spans the past 50 with the AE segment coming into existence 18 years ago (circa 1990). A brief historical background of CRAF, specifically the AE segment, will set the stage and support the problems associated with the current CRAF AE never having been formally validated through an exercise or operations, unlike that of cargo and passenger segments. On 6 July 1987, President Reagan signed National Security Defense Directive (NSDD) 280[1] reiterating the importance of CRAF to the national defense.

The concept of moving the wounded by air began almost simultaneously with the concept of fixed-wing aircraft flight.[2] Shortly after the Wright brothers successfully flew their first airplane, two US Army medical officers, Capt George H. R. Gosman and Lt A. L. Rhodes designed an airplane to transport patients. Using their own money, they built and flew the world's first air ambulance at Fort Barrancas, Florida, in 1910. Unfortunately, on its first test flight, it flew only 500 yards at an altitude of 100 feet before crashing. This flight, followed by Captain Gosman's unsuccessful attempt to

obtain official backing for the project, proved to be only the beginning of many challenges for the new concept.[3]

CRAF dates back to WWII. Air Mobility Command (AMC), then Air Corps Ferry Command, did not have enough strategic organic assets to meet wartime requirements; these shortfalls continued through the Korean conflict. Key lessons learned during WWII and validated in Korea was that organic lift assets were inadequate to respond to wartime requirements.[4] Government and legislature required a more formal national and strategic airlift policy; thus, several committees were formed to address these strategic-level shortfalls: the Finletter Commission was one of the first.

The Finletter Commission revealed that the nation's airlift would be unable to meet wartime needs and stated, "We must increase our commercial fleet." The report also disclosed that the military planned to "take over, as they did in World War II, as much of the civilian lines, domestic and international, as circumstances permit" and suggested the preparation of prior agreements to specify what equipment and services the airlines would furnish. The final report, submitted in December, 1947, stated, "As potential military auxiliary, the airlines must be kept strong and healthy." The Finletter Commission added, "They are not in such a condition at the present time."[5]

In May 1949, the Joint Chiefs of Staff (JCS) directed the AF to establish "evacuation systems" for both the Army and AF. On 7 September 1947, Secretary of Defense (SECDEF) Louis E. Johnson made a policy announcement directing that the transportation of patients of the armed services would be accomplished by aircraft when air transportation was available, when conditions were suitable for air evacuation, and when there was no medical contraindication to air transport.[6]

Three years after the Finletter commission, a wartime airlift requirement study called the Douglas Commission recommended establishing a three-tiered reserve of four-engine transports in the civilian airlines. The Douglas Commission admitted that the required military modifications, making the aircraft heavier, would increase the operating expense of airlines. The commission suggested that the military should pay the calculated difference. This report, in 1951, became the basis for organizing the commercial carriers to augment the military airlift system—the birth of CRAF.[7]

In June 1966, Headquarters USAF directed Air Force Systems Command to submit a proposed source-selection and procurement plan for a new AE aircraft. In July 1966, the DoD agreed to initiate a modernization program, and in January 1967 it approved the expenditure of $34 million to purchase eight aircraft plus spares. Three contractors responded with proposals: McDonnell-Douglas (DC-9A), British Aircraft Corporation (BAC-1ll), and Boeing (B-737). On 31 August 1967, McDonnell-Douglas received the contract, with the first aircraft delivery scheduled for August 1968, followed by one per month for seven months. The rollout ceremony of the C-9A Nightingale occurred on l7 June 1968. The aircraft was tested and delivered to Scott AFB, Illinois, on 10 August 1968. Eventually, 21 C-9As (see Figure 1) were purchased between 1967 and 1971.[8]

Figure 1. Final USAF C-9A flight to retirement at the museum Wright-Patterson AFB (photo courtesy of AMC).

USAF fixed wing aircraft support patient movement either through dedicated, designated, or opportune types of airlift. The C-9 Nightingale was the only USAF aircraft specifically dedicated for CONUS AE missions. The C-9 was added to the Integrated CONUS (Continental United States) Medical Operations Plan (ICMOP)[9] circa 1990 in

support of the CONUS redistribution plan and became the primary CONUS AE aircraft during peacetime; it augmented the C-130 during contingencies and in war. The ICMOP is a strategic agreement[10] with the Tanker Airlift Control Center (TACC) at Scott Air Force Base (SAFB), IL and was originally designed to help injured service members get home as quickly as possible after arriving in the United States from overseas[11]. Subsequently, non-dedicated airlift assets contribute to the success of the AE role during wartime. The C-9 became the CONUS precursor for the requirement of CRAF AE and has now been retired[12]; there is one on display at the main gate at SAFB.[13]

The National Airlift Policy (NAP)[14] issued in June 1987 reinforced the need for and use of the CRAF program, established in 1951.[15] The policy states that military and commercial airlift resources are equally important; that DoD should determine which resources must be moved by the military and which can be moved by commercial air carriers; and that commercial carriers will be relied upon to provide airlift beyond the capability of the military fleet. All CRAF participants must be U.S. carriers fully certified by the Federal Aviation Administration (FAA), and meet the stringent standards of Federal Aviation Regulations (FAR)[16] pertaining to commercial airlines (Part 121)[17]. To join CRAF, a carrier must commit at least 30% of its CRAF-capable passenger fleet and 15% of its CRAF-capable cargo fleet. Aircraft committed must be U.S. registered and carriers must also commit and maintain at least four complete crews for each aircraft.[18]

AMC (see Figure 2) analysts implement a number of surveillance initiatives to monitor the carriers' safety record, operations and maintenance status, contract performance, financial condition and management initiatives, summarizing significant trends in a comprehensive review every six months. These initiatives are supplemented by an open flow of information on all contract carriers between AMC and the FAA through established liaison officers.[19] Contractual oversight, airline compliance, and more specifically airline notification of any/all structural changes in order to maximize passenger space (revenue) appear to be a significant issue within the overall CRAF program.

Figure 2. AMC Logo for CRAF DoD Commercial Airlift Division SAFB.

CRAF has three main segments: international, national, and AE. This paper will focus on the AE segment that augments DoD in the evacuation of casualties from operational theaters to hospitals in the continental United States (CONUS). These aircraft are also used to return medical supplies and medical crews to the theater of operations. Kits containing litter stanchions, litters, and other aeromedical equipment are used to convert civil B-767 passenger aircraft into air ambulances.

Three stages of incremental activation allow for tailoring an airlift force suitable for the contingency at hand. Stage I is for minor regional crises, Stage II would be used for major theater war, and Stage III for periods of national mobilization. This paper will primarily focus on Stages II and III, traditional activation for CRAF AE; however, it should be noted that CRAF "all" or "in part" can be activated based on compelling needs as requested by Commander (CDR) USTRANSCOM and validated by the SECDEF.[20]

The CDRUSTRANSCOM with approval of the SECDEF is the activation authority for all three stages of CRAF. During a national or other crisis, if AMC has a compelling need for additional aircraft, it would prepare a request to the J3/5 CDRUSTRANSCOM to take steps to activate the appropriate stage/s of CRAF.

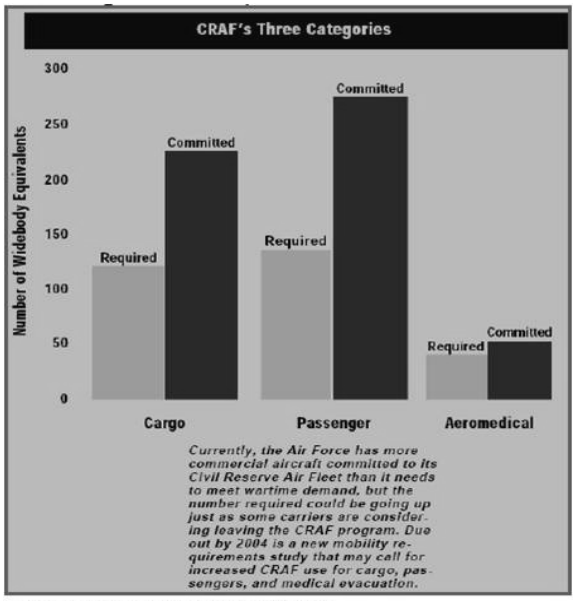
Each stage of the CRAF activation is only used to the extent necessary to provide the amount of civil augmentation airlift needed by DoD. When notified of "activation", the carrier response time to have its aircraft ready for a CRAF mission is 24 to 48 hours after the mission is assigned by AMC. The air carriers continue to operate and maintain the aircraft with their resources; however, AMC controls the aircraft missions.

CRAF cargo and passenger segments have been formally activated on two separate occasions over the program's 54-year history. The first activation was during Operations Desert Shield/Storm (ODS/S) from August 18, 1990 through May 24, 1991. The level of activation included long-range international passenger and cargo up to Stage II. The second activation was during Operation Iraqi Freedom (OIF) from February 8, 2003 through June 18, 2003. The level of activation included long-range international passenger up to Stage 1; long-range cargo was not required. To date, CRAF AE has never been formally activated; CRAF AE has only been "internally" tested once in January 2002.[21]

The entire CRAF program as of April 2005 enlisted 40 carriers and 1,126 aircraft. This includes 1,003 aircraft in the international segment (785 in the long-range international section and 218 in the short-range international section), and 83 and 36 aircraft, respectively, in the national and AE segments. These numbers are subject to change on a quarterly basis. As of October 2008 (see Figure 3), the following air carriers are members of the AE segment of CRAF: Delta Air Lines, United Airlines, and US Airways.

Contracting with air carriers to provide commercial aircraft to fulfill wartime needs is cheaper, in a sense, than purchasing and operating additional USAF cargo aircraft. However, CRAF is not free, and costs escalate once activated. The RAND [22] Corporation points out that:

Although holding reserve capacity in the CRAF is far more cost effective than holding the reserve in the military airlift fleet, the government has a financial incentive to use its own resources (for which it has already committed funds) in a crisis to the extent that they are conveniently available, rather than give additional business to CRAF carriers.[23]



Source: Air Force Magazine. February 2003. p.28.

Figure 3. Civil airline commitment to CRAF by segment.

More aircraft are committed to the CRAF program than are needed to fulfill the wartime requirements established by the Mobility Requirements Study[24] 2005 (MRS-05). There was a shortage of aeromedical evacuation aircraft, but this has been recently resolved (See Figure 4.). Program participants stated that they would be capable of providing the needed levels of aircraft and crews within the necessary time frames, even with recent furloughs and with crewmembers that have Air National Guard (ANG), Army Reserve (AR), or Air Force Reserve Component (AFRC) commitments. A new mobility requirements study could see an increase in the need for CRAF based on a change from the two major theater war (MTW) scenarios to the new strategy of planning for a range of military operations that was described in DoD's recent Quadrennial Defense Review (QDR) Report, issued in September 2001.[25]

Aircraft Committed to the Civil Reserve Air Fleet in June 2007, by Segment

	Cargo Aircraft			Passenger Aircraft		
	Stage I	Stage II	Stage III	Stage I	Stage II	Stage III
International Segment						
Long-range section	31	79	300	42	147	690
Short-range section	n.a.	12	12	n.a.	13	270
National Segment						
Domestic services section	n.a.	0	0	n.a.	24	37
Alaskan section	n.a.	4	4	n.a.	0	0
Aeromedical Evacuation Segment	n.a.	0	0	n.a.	25	50

Source: Congressional Budget Office using information from the United States Transportation Command.

Notes: Internal divisions of the Civil Reserve Air Fleet (segments and sections) reflect the unique capabilities required of committed aircraft.

n.a. = not applicable.

Figure 4. Aircraft committed to CRAF in June 2007, by segment.

Civil Reserve Air Fleet Aeromedical Evacuation Problem Statement and Methodology

The intent of this research is to stimulate interest in the strategic relevance and importance of CRAF AE and to determine whether the program should be updated or curtailed due to current requirements. While the cargo and passenger segments have been time tested, CRAF AE has never been formally validated through an actual joint, interagency exercise with multiple participants and actual or simulated patient movement. Research indicates there are provisions within joint[26] and national[27] doctrine that state CRAF AE should be formally validated to ensure that compliance and availability are met.

The author referred to Joint regulations, DoD regulations, AMC CRAF AE after-action reports, and CRAF Study Working Group minutes noting Institute for Defense Analysis[28] (IDA) and Council for Logistics Review[29] (CLR) recommendations as well as interviewing officials at TRANSCOM, AMC, and L3 Communications to determine an appropriate level event in which to "exercise" current CRAF AE capability while "validating" airline and other requirements set forth through the contracting process.

The 21st Century finds the civil air carrier industry experiencing unprecedented growth while, unfortunately, the military continues to struggle with a shrinking budget

and an ever-changing global environment. The problems discussed previously may prove to be crucial when examining the future of the CRAF program and its participants. The challenge for the DoD is in discovering, articulating, and implementing new ideas and programs that will minimize negative effects on civil operations while at the same time strengthening the relationships between the government and civil air carriers in order to meet future mobilization requirements.[30]

Post 9/11, the world is battling a formidable asymmetrical, net centric enemy. These global terrorist networks, coupled with our ever-changing technological advances, in concert with the recent declining global economy are more than sufficient reason to consider a DoD joint, interagency exercise of CRAF AE in order to "validate" the requirements against a PACOM plan and/or modify the program. The past several years, USTRANSCOM SG has been unsuccessful in obtaining CRAF AE support for its annual National Level Exercise[31] (NLE) Ultimate Caduceus[32] (UC) due to lack of funding and aircraft participant availability.

To date, CRAF AE has never been "validated" through participation in a joint, interagency exercise. CRAF AE was evaluated in the formal Developmental Test and Evaluation (DT&E) and the Operations Test and Evaluation (OT&E) milestones of its acquisition program. The only time CRAF has been "tested" was 7-19 January 2002 with a USAF, ANG, and AFRC exercise; an after-action report was produced and released in 2002. While several issues were identified, many issues remain unaddressed:

- Do the OCONUS Combatant Commander (COCOM) Contingency Plans (CONPLAN) requirements still exist?
- Is all equipment available, up-to-date (modernized) and certified?
- Never instituted for DoD Support to Civil Authorities (DSCA) Homeland Security (HS)… is there a need?

The exercise was a very controlled and limited test of the system and equipment, and it targeted "hands on" training of total force AE personnel.

The author obtained and reviewed data from USTRANSCOM, AMC, Office of the SECDEF, and one of the three participating CRAF air carriers to ascertain whether participants could respond to activation with the required number of aircraft and crews

and in the required time frame. Additionally, a representative from US Airways was interviewed to determine whether US Airways would be interested in participating in an exercise to "validate" the requirements as set forth in current contracts.

Aeromedical Evacuation Segment (circa 1990)

By the late nineties, AE faced new and daunting challenges. Modern conflict, routinely characterized by rapid, short-duration, high-intensity combat, has resulted in casualty generation with very little lead time. As a result, there is often no opportunity to set up en route contingency hospitals, and critically ill patients frequently have to be evacuated long distances to reach comprehensive medical care. This necessitates the movement of "stabilized" (rather than fully stable) patients, who often require intensive care during evacuation.[33]

Another key factor in aligning the AE organizational structure took effect October 1, 2000, when the TACC stood up an AE cell designated TACC/XOGA; initially the personnel belonged to AMC SG but were transferred to TACC. Major benefits in scheduling, improved response time, and decreased cost were realized almost immediately as the cell implemented various recommendations. The cell began working mixed cargo and AE missions on Atlantic Express C-17s (see Figure 5.) and used air-refueling missions, when appropriate, as well as Patriot Express[34] passenger missions for ambulatory (walking) patient movement (PM). These mixed missions resulted in an overall increase in AE mission reliability. C-141 AE missions continued to be scheduled, but their reliability remained an issue. In the PACOM AOR, mixed missions continued using C-17s and KC-135s while exploring other options.[35]

Figure 5. USAF C-17 Globemaster III flexible airlift aircraft; replacement for C-141.

The C-17 made its maiden flight on September 15, 1991, and the first production model was delivered to Charleston Air Force Base, South Carolina June 14, 1993. The aircraft can perform tactical airlift and airdrop missions and can also transport litters and ambulatory patients during AE when required. A basic crew of five (two flight nurses and three medical technicians) is added for AE missions. The aeromedical evacuation crew (AEC) may be pared and tailored as required in concert with patient movement needs.[36]

To date, AE has seen a paradigm shift and begs the question: should DoD curtail or reorganize its CRAF AE augmentation program with the introduction of new technologies, ever-morphing operational environment, and our depressed economy?

- Maximize opportune organic airlift to accomplish global AE requirements.
- Utilize new modularized palletized litter systems.
- Validate PACOM patient movement requirements.
- Formally exercise and validate the AE segment of CRAF.
- Exploit organic AE capabilities in appropriate future technologies.

The C-9Aand C-141 ended their distinguished roles as Air Force AE assets September 24, 2005[37] and May 6, 2006[38] respectively. In February 2001, the USAF chief of staff directed the removal of the red cross markings from the C-9A AE fleet.[39] AMC/Logistics (LG) designed and acquired a nonpermanent, quick-application red cross for use during times of war, contingency operations, or other instances in which the display of the red cross would be both desirable and appropriate. This capability will

allow the quick application of the red cross to any aircraft specifically dedicated for AE. This provides protection for patients, while allowing both AMC/TACC and theater air mobility operations control centers (AMOCC) additional flexibility in selecting from all available AE-capable aircraft for such missions.[40]

Since 2001, the AE system has focused on requirements-based scheduled support by purchasing seats and pallet spaces on the most appropriate aircraft rather than paying for entire airplanes.[41]

Internal Validation (January 2002)

To date, research indicates the only evaluation of CRAF AE was during 2002. The exercise, while very limited in external participation, was deemed a success. US Airways participated in the exercise along with participants from USTRANSCOM and its AF component, AMC. The exercise included civilian aircrews, which accomplished concurrent aircrew training during the AE patient evacuation from January 9–20. The exercise simulated procedures for CRAF activation during a national crisis. According to the article published in Air Force Times:

> Airliners in CRAF participate in the program by converting normal passenger jet aircraft for use as medical evacuation aircraft. Participating carriers are given prescribed time parameters for converting the aircraft and making them available for military use. US Airways aircraft 645 was "base-lined" or striped of most of its US Airways interior, including seats, center galleys, and closets, at the Charlotte base maintenance hangar. It was then flown to Greenville, TX where Raytheon Corporation, an Air Force contractor, installed specialized medical ship-sets to include a liquid oxygen system that supplied all litter patients with oxygen. In its new configuration, the Boeing 767-200 can transport up to 87 litter patients and 35 ambulatory patients (those not requiring a litter). [42]

According to various sources, over 300 active and AFR AE component personnel at six different air bases participated. The training benefits noted by both US Airways and the AF were:

> In-flight training included procedures for loading/unloading patients, overview of in-flight medical equipment, installation of the patient loading system, emergency de-pressurization procedures, on-board fires, and other possible aircraft emergency conditions. AE flight crews were also given an overview of the location and use of emergency equipment available on-board and its appropriate use.[43]

US Airways and the AF conducted this inaugural event on a Boeing 767-200 and indicated at the time that many such exercises would follow in the future. After the exercise, Jim Frazier, Director, US Airways Air Traffic Control (ATC) & Airfield Operations, summed it up best, "The conversion and training events have been very successful and US Airways and the AF are very pleased. US Airways is proud to participate in the DoD CRAF program and looks forward to many more years of this continued partnership."[44] No other CRAF AE exercise has been noted since 2002.

Technologies Bolster Organic Aeromedical Evacuation Capabilities

As a contender for the designated replacement for the KC-135, Northrop Grumman's KC-45[45] (see Figure 6) multi-role, tanker-transport is ready to serve as America's next-generation in-flight refueling platform. As a Total Air Mobility solution for the AF, the KC-45 claims to provide 25 percent more fuel than the KC-135, transports 1.8 times more bulk pallets than the C-17, and carries approximately 226 passengers or approximately 120 litters in an aeromedical configuration.[46] The KC-135 is only capable of carrying approximately 18 litters. The illustration below (see Figure 7) estimates that a typical configuration of 70 litter patients with 6 intensive care patients and up to 113 ambulatory or medical staff on the main deck.

Figure 6. Northrop Grumman KC-45 (X) while in flight on short-final to land (photo courtesy of Northrop Grumman).

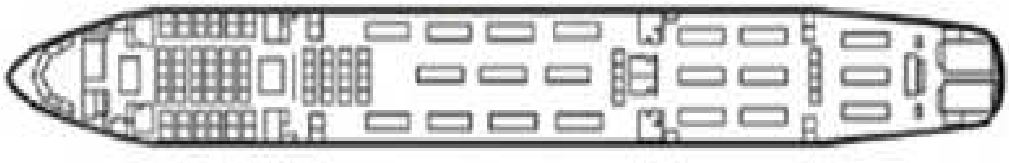


Figure 7. AE litter/medical personnel configuration as projected on KC-45 (X) (courtesy of Northrop Grumman).

Additionally, all tanker aircraft are capable of performing additional roles such as passenger lift, cargo movement, and AE when modified as set forth in Joint Publication 3-17, "Joint Doctrine and Joint Tactics, Techniques, and Procedures for Air Mobility"[47]. Furthermore, the mission capabilities study (MCS) stated the KC-X (45) will have the following capabilities which will exploit organic opportune lift[48]:

> **Cargo floor capabilities:** The aircraft shall be capable of efficiently transporting equipment and personnel and fit seamlessly into the Defense Transportation System (DTS). The aircraft's entire main cargo deck must be convertible to an all cargo configuration that accommodates 463L pallets, an all passenger configuration (plus baggage) (or equivalent AE (AE) capability to include ambulatory and /or patient support pallets) and must optimize a full range of palletized cargo, passengers, and AE configurations that fully and efficiently utilize all available main deck space.
>
> **Secondary mission capability:** The MCS specifically lists passengers, cargo and medical evacuation (MEDEVAC) as roles for the tanker. Tankers in the employment and deployment roles are well positioned to support designated MEDEVAC missions when properly equipped. In the warfighting scenarios used for MCS, the deployed tanker fleet is also well postured to support transshipment operations. The value of this additional capability is a function of restrictions placed on the CRAF from operating in anti-access conditions. The more CRAF is restricted, the greater the utility of the tanker fleet in moving cargo and passengers forward to support combat operations.
>
> **AE:** Capability to provide air transport and care in the air, using existing PSP, for 50 patients total, either 16 litter/34 ambulatory patients for up to 14 hours or 24 litter/26 ambulatory patients for up to 16 hours. The aircraft shall have the capability to accept the seat rail litter stanchions used on the C-17. The aircraft shall be equipped with integral equipment to configure for 5 AE crewmembers**.**

Litter Capability. The aircraft shall be capable of using the existing PSPs and the existing Litter Station Augmentation Set (LSAS). PSPs are a roll on/roll off system built on a standard 463L (108" x 88") pallet and configurable with litter stations, seats, or a combination. The LSAS is a kit containing 9 C-17 litter stations providing 27 litter positions. The aircraft shall have the capability to accept the litter stanchions used on the C-17 aircraft. A litter station should be capable of supporting up to 250 lbs in the top litter position, and 275 lbs each in the middle and bottom litter positions. Aircraft shall have integral (carried onboard at all times) capability to position six litter patients off the floor using two three-tier litter stations that are secured to structural hard points/recessed fittings in the aircraft floor.

During his presentation (see Figure 8) at the University of Texas (UT), Institute for Advanced Technology (IAT) to the Army War College (AWC) Senior Army Fellows, Maj Gen C. Bruce Green, Deputy Surgeon General of the Air Force[49] described the following technological initiative associated with patient movement, loading and safety.

Figure 8. Maj Gen C. Bruce Green addresses AWC UT Fellows.

Additionally, he explained the benefit of exploiting opportune airlift utilizing organic aircraft saying, "The use of opportune airlift (bringing in wartime logistics and taking out casualties) early in OEF/OIF clearly saved lives. The combination of well trained teams at forward logistic hubs, medics integrated into airlift processes to define requirements, and the coordination of the AE system by the Global Patient Movements Requirements Center (GPMRC), a unit within the USTRANSCOM SG located at Scott Air Force Base, Illinois. GPMRC utilizes the TRANSCOM Regulating Aeromedical

Command and Control Evacuation System (TRAC2ES), an electronic tracking system to track global patient movement and allow earlier evacuation and reduced theater bed requirements. It is possible that growth of the C-17 fleet and continued use of opportune airlift will diminish the need for large volume casualty movement associated with CRAF." [50]

New Aircraft Loader Protects Patients

The high-deck patient loading platform (HDPLP) is being explored as an alternative method for trans-loading patients onto high-deck aircraft. The new system is currently being tested at air bases in Bagram AFB, Afghanistan, and Landstuhl Regional Medical Center (LRMC), Germany. Officials at AMC plan to acquire several HDPLP vehicles.

This evolved patient loading equipment provides greater patient safety, protection from environmental elements, and is much more stable than the older (manual) patient loading system currently being used (see Figure 9).

Figure 9. The first Air Force High Deck Patient Loading Platform aligns with a KC-135 to offload patients to be transferred to Landstuhl Army Regional Medical Center, Germany here April 9. The new HDPLP, a special purpose vehicle which limits the time a patient is exposed to outside elements, is one of three vehicles in the Air Force inventory. (USAF photo by Master Sgt. Demetrius Lester.)

The HDPLP can be configured with six litters and ten ambulatory patients and/or medical staff; the vehicle can be configured in a myriad of configurations. Several HDPLP systems are operational; one at Bagram[51] and another at Ramstein Air Base, Germany. According to an interview with BG Doug Robb[52], AMC Command Surgeon, the HDPLP has several issues that warrant further testing and evaluation. Another is being tested at SAFB, IL; in a press release from SAFB, each system costs approximately $346,000.

The HDPLP cab (patient holding area) elevates to the level of the entrance on any high-deck commercial or organic aircraft. The majority of AF organic aircraft used for AE have low-level loading decks (ramps) that enable patients to be loaded directly onto the ramp (near tarmac level) such as the picture of the C-17 (in Figure 10, courtesy of USAF) in lieu of using the PLP or HDPLP.

Figure 10. USAF C-17 Globemaster III with rear ramp lowered as configured for partial AE (photo courtesy USAF).

The B767 (CRAF) aircraft and the KC-135 are both high-deck aircraft that require the use of the new HDPLP or older, less stable PLS pictured in Figure 11. The PLS was used on the C-9 Nightingale (now retired). The special purpose HDPLP vehicle has a climate controlled and lighted cabin and was designed specifically to access high-deck platform airframes, such as KC-135, CRAF B-767, and KC-10, for servicing and trans-loading patients.[53]

Figure 11. Older, less stable PLP, Brooks City Base, San Antonio, TX.

According to MSgt Scott Curran, most, if not all, of the PLS units have been heavily used and are quite cumbersome (see Figures 12 and 13). Many aluminum alloy parts may have become corroded and are difficult to maintain because most of the PLS units remain outdoors in the elements due to their size. Since the PLS is an "open" rather than closed system, as the HDPLP, many patients and litter bearers are apprehensive when crossing (being loaded) the ramp during inclement weather.

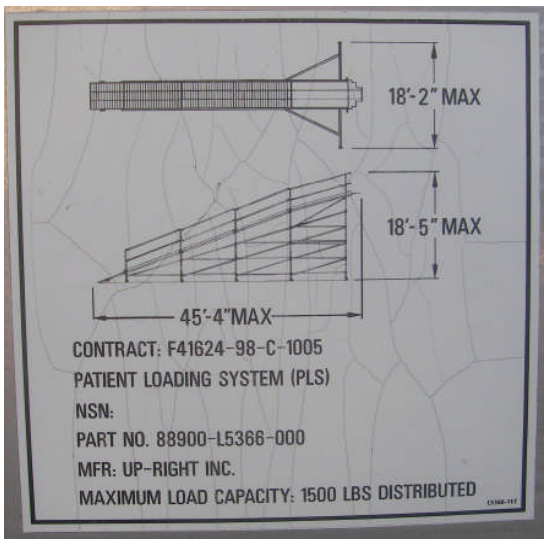


Figure 12. Patient Loading System placard with dimensions.

Figure 13. Joints and braces exposure.

AE Pallet System Converts Airplanes to Ambulances[54]

According to Aeronautical Radio Inc. (ARINC) Engineering Services, ARINC has developed a modular pallet system that converts standard cargo aircraft into a high-capacity AE platforms; the system can also convert passenger aircraft (B767 CRAF participant) to carry patients on standard NATO medical litters.

The Aeromedical Pallet System (AAPS), called a patient support pallet (PSP) by the USAF, was specifically developed for the USAF and is now being offered to the world's defense and civilian emergency agencies for use with existing aircraft (see Figure 14). According to Lisa DeDecker, Lt Col, USAF (ret), who was instrumental in the development and implementation of the PSP, the PSP expands the tool box of both TACC and the AECT, allowing them to utilize virtually any Mobility Air Force (MAF) aircraft for AE. The PSPs have been used extensively to support both OEF and OIF.[55]

Figure 14. AAPS or as called a PSP by USAF; courtesy of ARINC.

The pallet system is based on a reinforced and insulated aluminum cargo pallet (NATO 463L[56]) and can be equipped with seats to carry ambulatory patients or upright stanchions to carry medical litters. Depending on configuration, pallets can carry up to eight patients. Organic cargo aircraft using the AAPS system can carry from 30 to 168 patients (see table below). The AAPS stanchions may be mounted onto the seat-mounting rails of passenger aircraft such as the B767 used in the CRAF AE program.

According to ARINC, the AAPS is shipped with seats or litter stanchions in place and maintained as required in storage facilities. ARINC claims the system can be set up and secured in less than 30 minutes. Multiple configurations are based on the type of aircraft and the number and priority of patients to be moved. Additionally, other kits include power conversion, lighting, and oxygen kits that could possibly be used to convert ships or trucks into patient movement platforms.[57]

ARINC reports the USAF has approximately 25 AAPS systems in use with its current inventory of opportune cargo aircraft (C-17, KC-135, and KC-10). Of note, according to Lt Col (ret) DeDecker, the PSP should not be used on the C130; the PSP

loads an aircraft perpendicular to its fuselage, so patients on litters could be susceptible to shearing forces during a mishap and potentially killed. Finally, the PSP can only be used on the KC-10 for active duty evacuation because the KC-10 is a commercial variant and must follow FAA rules; STC (see Figure 15[58]) has not been provided for the change.

Aircraft Type	Pallet Capacity	Patient Capacity	Patient Capacity With Extensions
KC-135/B707	6	36	n/a
KC-10/DC-10	27	162	216
C-17	18	108	144
C-130/L100	4	24	32

Figure 15. Aircraft capacity for AAPS pallets and patients (courtesy of ARINC).

CRAF AE Unknown Equipment Modifications

There appear to be several points of conflicting information. In meeting with AMC personnel, from October 22-24, 2008, some very interesting and pertinent facts were elevated. Of the three CRAF AE participating airlines, one had completely dropped out of the program due to equipment modification requirements, specifically air-space management avionics for Europe; another airline reported having only four of thirty-five aircraft available because modifications were made to the aircraft thus requiring recertification of Federal Aviation Administration (FAA) Supplemental Type Certification (STC). The third carrier reported 100 percent, having four for four aircraft available[59] (see Figure 16).

On/about October 17, 2008, a letter was prepared by AMC A3BC (Commercial Aircraft Division) and sent to Delta airlines requesting validation of available aircraft apportioned for CRAF AE and explanation of what is being done to correct the impending issues. To date, no further explanation for why United Airlines fell out of the program other than speculations that major costs were associated with updating and maintaining air-space management avionics, and it wasn't cost beneficial to remain in the program. The third airline, US Airways, remained, 100 percent available but only provides four aircraft to the CRAF AE segment. Bottom line was that during the week of

October 22, 2008, of the thirty-nine aircraft apportioned by civil air carriers to USTRANSCOM in support of CRAF AE, only eight were readily available. This data is not reflected in the CRAF Capability Summary dated October 1, 2008 (see Figure 17).[60]

AEROMEDICAL EVACUATION SEGMENT (B-767 Aircraft Only)								
AIRLINE AND CRAF STAGE	Delta Air Lines (DAL)		United (UAL)		US Airways (USA)		TOTALS EACH STAGE	
AIRCRAFT TYPE	II	III	II	III	II	III	II	III
B767-200ER					3	4	3	4
B767-300ER / DR	22	35					22	35
TOTALS	22	35			3	4	25	39

Figure 16. AMC HQ Form 312, AE Segment (B767 aircraft only), 1 October 2008.

SOURCE: HQ AMC/A3BC	As of: 01 Oct 2008		
AIRCRAFT SUMMARY	STAGES		
	I	II	III
DOMESTIC SERVICES CARGO		0	0
DOMESTIC SERVICES PAX		23	36
ALASKAN		4	4
SHORT RANGE INTERNATIONAL CARGO		11	25
SHORT-RANGE INTERNATIONAL PAX		10	292
AEROMEDICAL EVACUATION		25	39
LONG-RANGE INTERNATIONAL PAX	43	123	449
LONG-RANGE INTERNATIONAL CARGO	31	73	230
TOTAL CRAF	74	269	1075

CIVIL RESERVE AIR FLEET (CRAF) CAPABILITY SUMMARY

Figure 17. AMC HQ Form 312, Civil Reserve Air Fleet Capability Summary, 1 October 2008.

Need for Generic AESS and Patient Loading System (PLS)

> Within the CRAF program we desire a US-flagged commercial airline capability to carry outsized cargo and a new aeromedical evacuation ship set (AESS), able to convert several types of commercial aircraft for the AE mission, to improve operational flexibility and responsiveness.
>
> Norton A. Schwartz, GEN, USAF

In the coming years, DoD's management and employment of CRAF will need to adapt to meet a number of significant challenges. But if DoD takes appropriate steps, it can continue to rely on adequate support from US airlines for its military operations through the remainder of this decade and beyond.[61]

There is much discourse about whether generic AESS and other equipment modernizations is the answer to whether CRAF AE is required. There appears to be a definite requirement for a feasibility study and cost analysis to be conducted regarding generic PM equipment. The immediate need is that the B767 aircraft is subject to phase out within the next 10–12 years and the "on-hand" AESS will only fit the B767. Figures 18–20 show the detailed, cumbersome, and complex configuration of the current AESS as assembled for training purposes in the L3 Communications B767 Simulator at the USAF School of Aerospace Medicine, Department of Aerospace Education and Training, Brooks City Base, San Antonio, TX. The author met with MSgt Scott Curran, Lead Instructor and Custodian for the simulator on 12 November 2008.

Figure 18. B767 CRAF AE Training Simulator, Brooks City Base, San Antonio, TX.

As MSgt Curran and I discussed the need for continued training, I was amazed at the complexity and cumbersome engineering of the PM (litter) stanchions. Further, it is our belief that due to the refined construction and close tolerances that there might be instances that would delay and/or preclude L3 from configuring an aircraft within the

contractual time lines. MSgt Curran further stated there is never enough time to train to all personnel to ensure familiarization with AESS, especially with all of the trip hazards, wires and cables associated with their configuration, not to mention proper prioritization for patient loading to facilitate care in the air due to space limitations.[62]

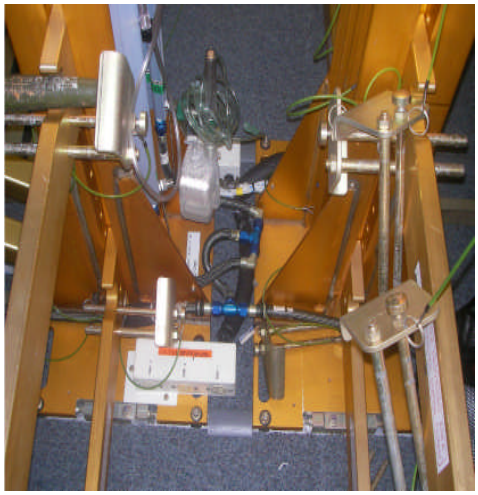


Figure 19. Complex and cumbersome engineering of litter stanchions.

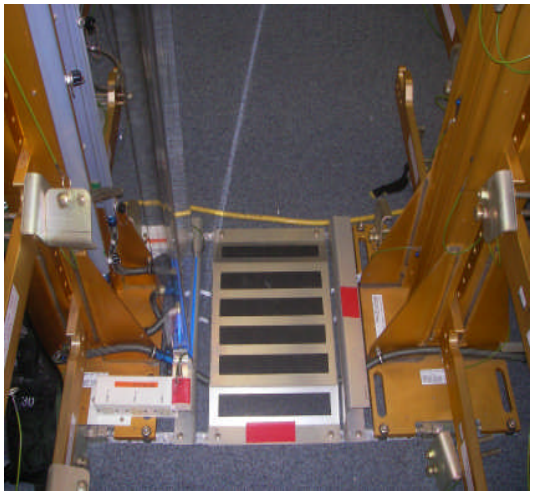


Figure 20. Trip hazards.

During the course of this research I had countless opportunities to converse with Maj Gen Bruce Green, USAF Deputy Surgeon General. Maj Gen Green was present

during the 2002 exercise with US Airways and agrees that many of the issues during the exercise may or may not have been addressed to date. I asked him if he had taken an opportunity to train in the simulator, and more specifically if he had participated as a litter bearer utilizing the patient loading ramp. His answer was loud and clear, "Yes, I've had several opportunities to observe CRAF AE simulator training and yes… I have loaded patients using the patient loading ramp and [laughing] hope I never have to do it again." Hence, he is very proud to introduce the new and enhanced HLPLP aforementioned in his brief. On a note related to MSgt Curran's comment about possible configuration delays, Maj Gen Green commented on a nonspecified delay that occurred during the exercise in 2002 and that further CRAF AE exercises were warranted in order to comprehensively evaluate the program.[63]

US Airways, Committed CRAF Partner

During an interview with Mr. Denis Barrett on January 6, 2009[64], CRAF AE Operations Officer, US Airways, Pittsburg, PA confirmed that US Airways would be interested in participating in an exercise to formally validate its role in CRAF AE. Mr. Barrett was present, in another capacity with US Airways, during the 2002 exercise with the USAF. He intimated there were several issues that required research and is not confident that all the issues were resolved. Further, Mr. Barrett feels that CRAF AE is an intricate program with moving pieces, and as such, to the program should warrant a formal exercise in order to validate its effectiveness.

US Airways would like to be given appropriate notification and resources and prefers the exercise be conducted during their "off season" (low passenger) schedule. According to Mr. Barrett, US Airways' low–passenger census begins the end of November and continues through mid March into early April. This would give an approximate five-month exercise window for US Airways participation.

I followed up our telephone interview by sending US Airways (Mr. Barrett) a questionnaire containing ten questions regarding aircraft availability, associated costs, any program issues and to confirm US Airways commitment, given proper notice and coordination, to participate in a formal exercise in the not too distant future (i.e., 2010).

Mr. Barrett confirmed that US Airways has four aircraft (see Figure 21.) committed to the CRAF AE program and is working on completing the questionnaire.

Figure 21. US Airways B767 taxis along tarmac (Photo courtesy of US Airways).

CRAF AE Study and Analysis

> Mutually supporting relationships are essential to the success of any enterprise and ours is no different. The Civil Reserve Air Fleet (CRAF) is a critical partner in our nation's ability to project forces and sustain forces. Our legislature initiative is aimed at preserving CRAF viability by providing a prudent amount of assured business to our commercial airline partners, thus incentivizing them to maintain sufficient aircraft availability to meet future DoD needs.
>
> Norton A. Schwartz, GEN, USAF
> Commander, USTRANSCOM

> The air mobility fleet continues to face many challenges, while remaining one of the Department of Defense's crown jewels. Critically, the air mobility capability of the nation must remain vibrant, flexible, and responsive to meet the imperatives of the warfighter and allow the nation to project our national interests. We appreciate Congress' support to help us recapitalize and modernize America's mobility fleet and make our plans a reality.
>
> Arthur J. Lichte, GEN, USAF
> Commander, AMC

DoD's war plans and exercises should examine future airlift operational concepts that enhance the effectiveness of CRAF. A limited informal survey of CRAF participants finds they are supportive of DoD's engagement with the industry in planning and operations supporting OEF and IOF. CRAF participants support an ongoing DoD-industry CRAF planning group to strengthen future plans and operations.[65]

The current AE requirement for CRAF is 32–40 aircraft; there are 43 AESS units available, two of which are training venues at Brook City Base and Shepard AFB in TX. This requirement is based on several factors, including the projected casualties associated with the types of operations envisioned and estimated cycle times. AMC and TRANSCOM are currently reviewing the AE requirements for CRAF AE. In light of this ongoing review, it is practical at this point in time to continue planning for 32–40 aircraft for this purpose, given the specialized nature and criticality of this strategic capability, and the relatively small number of aircraft involved.[66]

The FY08 National Defense Authorization Act (NDAA)[67] directs an independent assessment of the CRAF program, and USTRANSCOM has the lead in supporting this study, which is being accomplished by the IDA. However, simultaneously, there is a Secretary of the Air Force-directed CRAF study ongoing, being performed by CLR. The initial focus of this study was to review how the DoD moves cargo via commercial air, and determine if it is possible to move toward the method the US Post Office adopted by negotiating rates with industry to save taxpayers money.

This CLR-led study has expanded beyond the initial guidance and is now looking at ways to ensure the CRAF remains a viable program for national security for years to come, post OEF/OIF. CLR provided a progress update to AMC and USTRANSCOM leadership in February 2008. The study has included interviews with government representatives as well as industry experts, and gathering of historical data from the two previous CRAF activations to support ODS/S and OIF. The final report is due to the Secretary of the Air Force in July 2008.[68] The findings shouldn't be too surprising considering GEN Schwartz is the former CDRUSTRANSCOM and is intimately familiar and supportive of the CRAF AE program. The slides in Figures 22 and 23 were provided by USTRANSCOM and were briefed to General Duncan McNabb, USAF, CDR, USTRANSCOM on December 22, 2009[69].

According to TCSG and AMC/SG, there is still a wartime requirement (dated PACOM MAT estimate) for the CRAF AE segment, and a distinct delta exists between CONPLAN patient movement requirements and the organic AE capability. Both TCSG

and AMC SG concede that the B-767 shipset will need eventual replacement as that aircraft is replaced in carriers' systems.

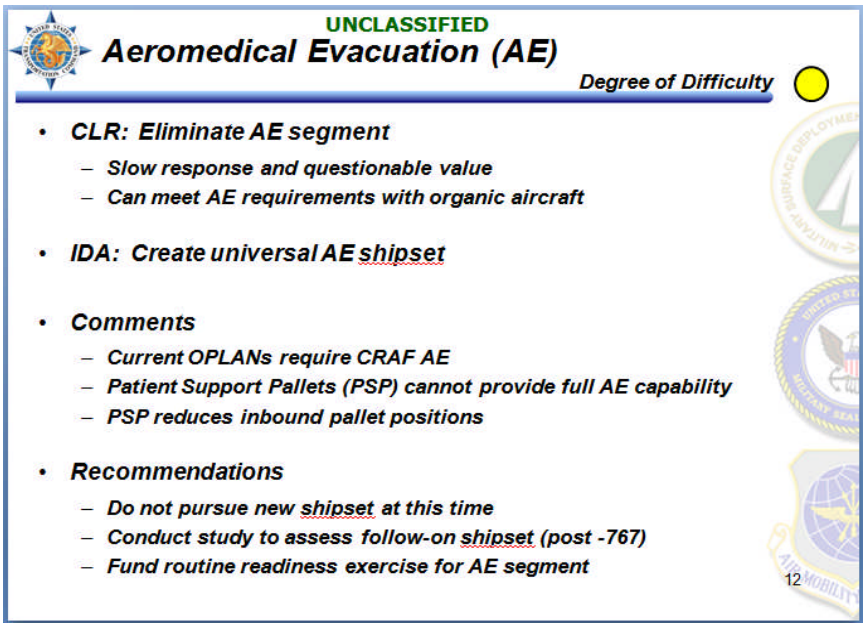


Figure 22. TCSG comments on CRAF AE and recommendation to CDRUSTRANSCOM.

There is also an unknown requirement to support USNORTHCOM and DHS domestic AE requirements. Though these have never been quantified, we do know the current AE shipset is unsuitable for rapid domestic response. A new universal shipset might be more useful in domestic scenarios[70]. Both IDA (program focused) and CLR (cost focused) analyzed impacts of readiness and capability[71], program and policy conflicts, and difficulty factors such as legislation, legality, and complexity of CRAF. IDA and CLR recommend improving utilization and specifically CLR recommends "elimination of the AE segment" while IDA recommends "replacing the current AESS with a universal design to exploit other aircraft with quicker response."[72]

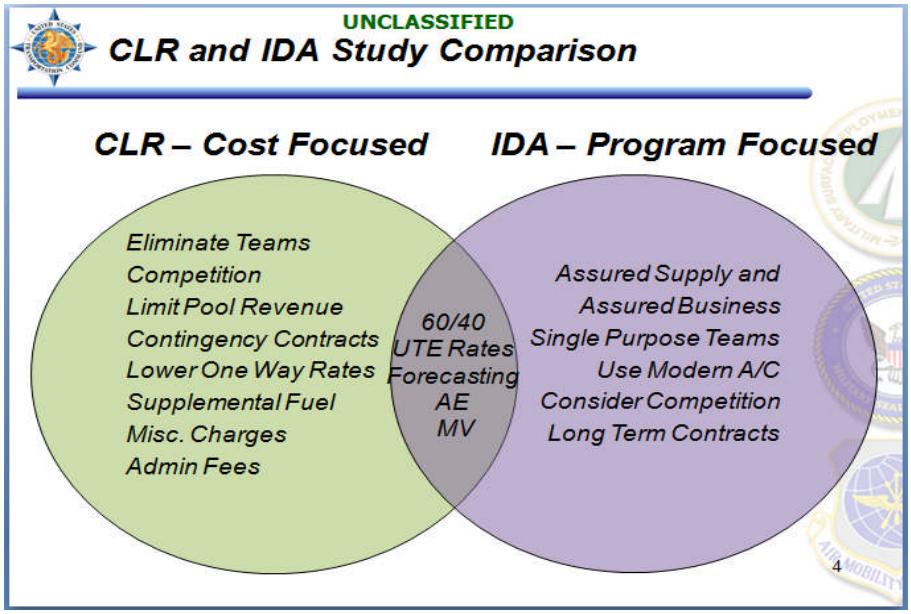


Figure 23. CLR and IDA CRAF study cost versus program comparison.

During meetings with Brigadier General (BG) Doug "Drugs" Robb, AMC and Colonel (COL) Bill Statz, USTRANSCOM SG, discourse included but was not limited to conducting an exercise whereby CRAF AE is placed into service. The exercise would span from activation (Crawl phase) through delivery and being formally exercised (Walk phase). Afterwards, the aircraft would be placed into normal service (Run phase) as the AE channel aircraft for a period (TBD) prior to reconfiguration and being returned to the carrier:

Crawl phase:

Command Post Exercise (CPX) beginning with Commander AMC recommendation to activate CRAF in support of a national emergency through CDRUSTRANSCOM.

Walk phase:

Static training followed by Field Training Exercise (FTX); loading/unloading of patients and flight crew familiarity training.

Run phase:

Place configured aircraft into channel service moving patients and managed by TACC.

Reconfigure phase:

Return aircraft to L3 for baseline reconfiguration, maintenance and return aircraft to US Airways.

After Action Review:

Conduct facilitated after action–review (FAAR) with all participants to capture significant issues, discussions and recommendations for improvements.

The intent of the exercise is to validate time lines and compliance within current contractual language. The time necessary to complete comprehensive Statements of Need (SON) and Work (SOW) should be created and follow-up work should ensure that an exercise could be programmed for execution in 2010, with monies identified by AMC and USTRANSCOM during the 2009 Program Objective Memorandum (POM).[73] BG Robb noted the CRAF discrepancy discovered in October 2008 as being akin to "beer" meaning the CRAF AE environment is an ongoing operational and political issue which, unlike wine, will not age well. He agrees that the CRAF AE program must be validated against current OPLANs and validated as a current requirement. Sooner is better.

Conclusion

There are significant disagreements among major commands, research groups, interagencies, DoD, and the like of whether CRAF AE remains a viable platform for strategic PM. Many research projects and theses are published regarding CRAF AE; numerous papers conclude the need to investigate current requirements and the validity of the program against current OPLANs and economies of scale. However, to date, research indicates CRAF AE has never been "exercised and validated" within a joint, interagency setting.

Unfortunately, funding for medical exercises can be exorbitant; thus, many valuable opportunities are often missed. However, monies must be allocated for a robust validation exercise in order to make an informed decision regarding the future of CRAF

AE. If for no other reasons than current friction caused by changes in our global economy, political structure, and numerous former recommendations, research urges that the program be thoroughly and fairly tested, not unlike its complementary counterparts CRAF cargo and passenger segments. No one will really know whether CRAF AE remains viable today until the program is truly validated and vetted through a joint, interagency exercise.

Finally, an exercise that is associated with a PACOM plan (the primary reason for CRAF inception) or opportunity to train during a congressionally mandated Top Officials (TOPOFF)[74] annual or other joint, interagency exercise would be the best course of action. CRAF's inception was necessary due to overwhelming casualty estimates based on the Medical Analysis Tool (MAT) simulated by joint medical planners against appropriate OCONUS COCOM OPLANs. Could CRAF AE become feasible in support of CONUS-based natural disasters or no-notice multiple-simultaneous incidents within USNORTHCOM such as outlined in the National Response Framework (NRF), specifically related to one of several National Planning Scenarios (NPS)?

According to USTC SG there is an unknown requirement to support USNORTHCOM and DHS domestic AE requirements. Though these standing requirements have never been quantified, we know the current AE shipset is unsuitable for rapid domestic response.[75] While a new universal shipset might be more useful in domestic scenarios, TCSG does not recommend pursuing a new AESS at this time; however, a replacement shipset will become necessary as the B-767 ages out of passenger service. Also, funding a routine readiness exercise to exercise the capability is recommended.

CRAF AE change should occur in the most cost-effective manner. If a new shipset is the answer, phase out or reduce CRAF mobilization value (MV[76]) participation points for AE should be over time, since some of the CRAF carriers have planned and spent money in making their aircraft adaptable to the AE shipsets.[77] Existing CRAF AE carrier feedback is essential.

Current casualty estimates are essential, patient movement numbers must be accurate in order to trigger CRAF. MAT is the only JS approved casualty estimate

automated tool with two overarching principal functions: (1) determination of medical support requirements and (2) COA analysis.[78] The current OPLAN-driven requirements for AE exceed the capability of the AMC organic airlift fleet, which is restricted to use on the B767 aircraft. There are 43 AESS units stored and maintained in Greenville, TX by the L3 Corporation. The contractor is capable of reconfiguring two aircraft per day, meaning that activation of the full CRAF AE segment could take weeks to complete. However, though slow, the current response time is considered adequate by AMC and USTRANSCOM SG planners[79].

Failure to recognize the importance and numerous recommendations to validate CRAF AE may endanger service men and women and our strategic ability to move patients in a no-notice catastrophic event. Current validation of USPACOM requirements should be analyzed as well.

Recommendation: Exercise and Formal Validation

In closing, to CRAF or not to CRAF is the ever relevant question regarding DoD strategic AE. In order to make an informed decision, this paper recommends further CRAF AE research and formally exercising (e.g., Terminal Fury 2010[80]) CRAF AE against known PM requirements (e.g., USPACOM AOR) and further, validating its relevance for continued participation within the CRAF program.

The passenger and cargo segments of CRAF have been utilized and time tested since CRAF's inception, whereas CRAF AE has not. Prior to a decision being made to preserve or curtail the AE segment of CRAF, shouldn't the program be formally validated? No matter the cost, if a Service Member life is saved, it is worth every penny.

> Apart from war itself, we have no higher priority than the care of our wounded Soldiers.
>
> Dr. Robert M. Gates
> Secretary of Defense

Bibliography

Air Mobility Command, After Action Report (Final), Civil Reserve Fleet (CRAF) Aeromedical Evacuation (AE) Training Exercise, 7-19 January 2002.

Air Mobility Command Public Affairs Office. "Fact Sheet-Civil Reserve Air Fleet." 10 October 2005 http://af.mil/factsheets/factsheet.asp

Air Mobility Command, *Civil Reserve Air Fleet (CRAF),* AMCI 10-402. Washington DC: HQ AMC, 1 September 2004.

Banholzer, David. *The Civil Reserve Air Fleet: A Vulnerable National Asset.* Master's Thesis. Naval War College, Newport, RI, 13 February 2006.

Benjamin, Frank. *Continued Evolution of the Air Mobility Command.* Strategic Research Project. United States Army War College, Carlisle Barracks, Carlisle, PA, 15 Mar 2006.

Bolkcom, Christopher. "Civil Reserve Air Fleet (CRAF)," CRS Report for Congress, Washington DC, 18 October 2006.

Congressional Budget Office. *Issues Regarding the Current and Future Use of the Civil Reserve Air Fleet.* Washington DC: Congressional Budget Office, October 2007.

DeKinder, Dale L. *EXPRESS IT: Privatization of Airlift*. Graduate Research Paper, Marine Corps University Command and Staff College, 1992.

Department of Defense. Joint Doctrine for Mobilization Planning. Joint Publication 4-05. Washington DC: GPO, 22 June 1995.

Department of the Air Force. Air Mobility Master Plan. Washington DC: Department of Defense, 1998. USAF, 25 June 1999.

Department of the Air Force. Air Mobility Operations. AFDD 2-6. Washington DC: HQ USAF, 25 June 1999.

DoD Directive 5158.04, "United States Transportation Command," Washington DC, Department of Defense, 27 July 2007.

DoD Directive 6000.11, "Patient Movement," 9 September 1998.

DoD Directive 6000.12, "Health Services Operations and Readiness," 29 April 1996.

DoD Directive 6010.12, "National Disaster Medical System," 21 January 2003.

DoD Instruction 4500.57, "Transportation and Traffic Management", 18 March 2008.

Franco, Crystal et al. *The National Disaster Medical System: Past, Present, and Suggestions for the Future.* Biosecurity and Bioterrorism: Biodefense Strategy, Practice and Science, Volume 5, Number 4, 2007: 319-325.

General Accounting Office. *Military Readiness: Civil Reserve Air Fleet Can Respond as Planned, but Incentives May Need Revamping.* GAO-03-278. Washington DC: GAO December 2002.

Graham, David and others. *Sustaining the Civil Reserve Air Fleet (CRAF) Program.* Institute for Defense Analysis, Alexandria, VA, 1 May 2003.

Green, C. Bruce, *Challenges of Aeromedical Evacuation in the Post-Cold-War Era.* Aerospace Power Journal, Winter 2001, 6 December 2001.

Headquarters, Air Mobility Command, White Paper, AFD-070227-044, KC-X: The Next Mobility Platform, the Need for a Flexible Tanker, Annex D – Airlift Requirement Information

Headquarters, United States Transcom, Way Ahead Briefing: CRAF Study Analysis, to Gen McNabb, CDR, USTARNSCOM, 22 December 2008.

Joint Chiefs of Staff. *Mobility Requirements Study 2005*. Washington DC: U.S. Joint Chiefs of Staff, November 2000.

Joint Publication 3-17, "Joint Doctrine and Joint Tactics, Techniques, and Procedures for Air Mobility" (14 Aug 02 Incorporating Change 1 14 Apr 06).

L3 Communications, CRAF AE B767-200/300 Mission Conversion Kit A/A99S-3, proprietary slides, 13 September 2007.

Reagan, Ronald. President of the United States. *National Security Decision Directive Number 280: National Airlift Policy*. Washington DC: The White House, 24 June 1987.

Richardson, Dawn D. *Analysis and Evaluation of Current Challenges in the Aeromedical Evacuation Mission Segment of the Civil Reserve Air Fleet*. Master's Thesis, Naval Postgraduate School, Monterey, CA, March 2000.

Schwartz, Norton A., Commander, United States Transportation Command. "On the State of Command," Address to the House Armed Services Air and Land Forces Subcommittee, Washington DC. 1 April 2008.

Schwartz, Norton A., Commander, United States Transportation Command. "On the State of Command," Address to the Senate Armed Forces Committee Seapower Subcommittee. Washington DC. 4 April 2006.

Sheridan, James D. *Civil Reserve Air Fleet (CRAF): A Participation Analysis 1986-2005.* Graduate Research Report. Department of the Air Force, Air University, Wright-Patterson AFB, 13 June 2006.

Endnotes

[1] http://www.fas.org/irp/offdocs/nsdd/nsdd-280.htm

[2] *Anything, Anywhere, Anytime: An Illustrated History of the Military Airlift Command, 1941–1991* (Scott AFB, Ill.: Headquarters Military Airlift Command, Command Historical Office, May 1991).

[3] Brig Gen Bruce Green, "Challenges of Aeromedical Evacuation in the Post-Cold-War Era," Airpower Journal, Winter 2001, n.p./on-line, Internet, 6 December 2001, available from www.airpower.maxwell.af.mil/airchronicles/apj/apj01/win01/green.html

[4] Baske, Colin, *"Airlift Tanker: History of U.S. Airlift and Tanker Forces"*, Turner Publishing, 1995, 23.

[5] Major Dale L. DeKinder, "*Express It: Privatization Of Airlift*", Marine Corps University Command and Staff College, 1992.

[6] Green, 2.

[7] DeKinder, 3.

[8] Green, 2.

[9] http://www.minneapolis.afrc.af.mil/news/story.asp?id=123108838

[10] National Security Defense Directive 6010.12, National Disaster Medical System, January 21, 2003 accessed at http://www.google.com/search?sourceid=navclient&ie=UTF-8&rlz=1T4TSHB_enUS245US245&q=ICMOP%2c+US+Army

[11] http://www.afrc.af.mil/news/story.asp?id=123071113

[12] AF News, Final C9 flight, tail 876, http://af.mil/news/story.asp?id=123011872.

[13] Green, 2.

[14] National Security Decision Directive 280, June 24, 1987.

[15] Executive Order No. 10219, 16 *Federal Register* 1983 (Feb. 28, 1951).

[16] http://www.faa.gov/regulations_policies/

[17] http://www.faa.gov/search/?q=121

[18] Bolkcom, Christopher. "Civil Reserve Air Fleet (CRAF)," CRS Report for Congress, Washington DC, 18 October 2006.

[19] Ibid.

[20] *DoDD 5158.04, July 27, 2007.*

[21] GAO-03-278, a report to the Chairman, Subcommittee on Military Readiness, Committee on Armed Services, House of Representatives, Dec 2002.

[22] http://www.rand.org/

[23] See CRS Report RS20915, *Strategic Airlift Modernization*, by Christopher Bolkcom for more information.

[24] MRS-05, http://www.gao.gov/new.items/d03278.pdf

[25] Quadrennial Defense Review Report, Department of Defense, September 30, 2001.

[26] http://www.dtic.mil/doctrine/jel/new_pubs/jp4_01_1.pdf

[27] Joint Strategic Capabilities Plan, Joint Medical Planners Working Group slides, 10 January 2001, accessed at http://www.survivalring.org/nbcprep/jscp2.pdf

[28]http://www.ida.org/researchareas/forceandstrategyassessments/improving%20dod%20processes%20and%20organizations.php

[29] http://www.clrexec.com/site.cfm?id=226

[30] "Civil Reserve Air Fleet (CRAF) Allocation, "Lkd. Department of Transportation: Office of Emergency Transportation at "August 1999 OET/CRAF Monthly Allocations," (http//www.rspa.dot.gov/oet/enclos1_899.html/>29 November 1999), 1.

[31] National Exercise Program overview, Bill Schwinn, Federal Emergency Management Agency, Department of Homeland Defense, slides, 14 January 2009 accessed at http://www.google.com/search?sourceid=navclient&ie=UTF-8&rlz=1T4TSHB_enUS245US245&q=NLE%2c+DOD

[32] NLE 02-08 Ultimate Caduceus, http://www.js.pentagon.mil/doctrine/training, 4 October 2007.

[33] Green, 2.

[34] http://www.globalsecurity.org/military/library/news/2005/12/mil-051202-afpn06.htm

[35] 21st Century Aeromedical Evacuation, accessed 9 January 2009, http://www.olive-drab.com/od_medical_evac_fixedwing_21century.php.

[36] Air Force Link, C-17 Globemaster, http://www.af.mil/factsheets/factsheet.asp?fsID=86&page=5.

[37] http://www.af.mil/news/story.asp?id=123011872, accessed 10 November 2008.

[38]http://locjheedmartin.com/news/press_releases/2006/USAFRETIRESLASTLOCKHEEDMARTINC141ST.html

[39] "Emblem Removed on C-9 Aircraft," *Air Force News Service*, February 2001, on-line, Internet, 30 October 2001, available from "http://www.af.mil/news/Feb2001/n20010212_0204.shtml".

[40] Green, 2: Col Sheila A. W. Millette, AMC, Scott AFB Ill., talking paper, subject: Red-Cross Marked Aircraft, April 2001.

[41] Green, 2.

[42] "US Airways participates in Air Force CRAF Aeromedical Evacuation training exercise. (US Airways). "Defense Transportation Journal. 58.1 (Feb 2002): 30(1).

[43] Ibid.

[44] Ibid.

[45] Northrop Grumman KC-45: Why We Won - Key Selection Criteria, http://investor.northropgrumman.com/phoenix.zhtml?c=112386&p=irol-newsArticle_print&ID=1147737&highlight=, accessed 22 January 2009.

[46] Northrop Grumman website, accessed January 19, 2009, http://www.northropgrumman.com/kc45/operations/section.html.

[47] Joint Publication 3-17, "Joint Doctrine and Joint Tactics, Techniques, and Procedures for Air Mobility" (14 Aug 02 Incorporating Change 1 14 Apr 06).

[48] Headquarters, Air Mobility Command, White Paper, AFD-070227-044, KC-X: The Next Mobility Platform, the Need for a Flexible Tanker, Annex D – Airlift Requirement Information, accessed at http://www.amc.af.mil/shared/media/document/AFD-070227-044.pdf.

[49] Maj Gen Bruce Green, presentation to Army War College, University of Texas Fellows, Dec 2008.

[50] E-mail to author dated 21 January 2009, Maj Gen C. Bruce Green, USAF, MC, CFS, Deputy Surgeon General, bruce.green@pentagon.af.mil.

[51] http://militarytimes.com/forum/showthread.php?p=94894, 23 Apr 2008.

[52] Personal interview with BG Robb, AMC Command Surgeon, January 2009.

[53] http://www.airforcetimes.com/news/2008/04/airforce_patientloader_042208w/

[54] http://www.arinc.com/products/aircraft_systems/aeromedical_pallet.html, assessed 10 Nov 2008.

[55] Personal interview with Lisa DeDecker, USTRANSCOM SG, January 2009.

[56] http://www.bcaviation.co.uk/mobility/pallets_main.htm

[57] Ibid, 36.

[58] http://www.bcaviation.co.uk/mobility/pallets_main.htm

[59] Personal interviews conducted 22-24 October 2008 with AMC Surgeon, USTRANSCOM Surgeon and other AMC AE personnel.

[60] Point Paper prepared for BG Robb, AMC Surgeon, by LTC Damon K. Gooch/dkg/damon.gooch@us.army.mil/AWC Senior Military Fellow/Univ of TX/24 October 2008.

[61] Graham, David, et al. *Sustaining the Civil Reserve Air Fleet (CRAF) Program.* Institute for Defense Analysis, Alexandria, VA, 1 May 2003.

[62] Personal interview with MSgt Scott Curran, Senior Instructor and CRAF Simulator custodian, Brooks City Base, San Antonio, TX, November 2008.

[63] Personal interview with Maj Gen Bruce Green during the American Military Surgeon's of the United States (AMSUS) convention, San Antonio, TX, November 2008.

[64] Telephone interview, 6 January 2009 with Mr. Denis Barrett, CRAF AE Operations Officer, US Airways, "Barrett, Denis"denis.barrett@usairways.com.

[65] Ibid, 19, S-1.

[66] Ibid, 19, D-12.

[67] http://www.globalsecurity.org/military/library/congress/2008_rpt/sr-110-335.htm

[68] Department of the Air Force presentation to the House Armed Services Committee on Air and Land Forces United States House of Representatives, Subject: United States Transportation Command Posture and Air Force Mobility Aircraft Programs, Statement of: General Arthur J. Lichte, Air Mobility Command, April 1 2008.

[69] USTC Way Ahead Brief: CRAF Study Analysis, to Gen Duncan McNabb, CDR USTRANSCOM, 22 Dec 2008: 12 and 4.

[70] Ibid.

[71] Ibid.

[72] CRAF Study Working Group slide presentation, second meeting, 8 October 2008.

[73] Ibid, 17.

[74] National Response Framework (NRF), Emergency Support Function (ESF) 1, Transportation, January 2008, CRS-4.

[75] Ibid, 67.

[76] AMC attracts air carriers to commit aircraft to the CRAF by linking participation in the CRAF to entitlement to DoD airlift business. AMC uses the Mobilization Value (MV) Process to assign point values to CRAF aircraft based on their usefulness in meeting wartime requirements. Therefore, the MV Process has a significant impact on CRAF participation. AMC has modified the MV Process over time to keep pace with changing requirements, John A. Glaze; The Mobilization Value Process: Effects on CRAF Participation, Air Force Institute of Tech, Wright-Patterson AFB, June 1988, accessed at http://www.stormingmedia.us/57/5724/A572453.html

[77] Ibid.

[78] The Joint Staff, J4MRD, Joint Medical Planners Course, Washington, DC.

[79] Ibid.

[80] Joint Test and Evaluation Newsletter, Vol 9, Number 1, March 2008: http://www.jte.osd.mil/docs/newsletterarchives/March%202008%20%20Newsletter%20final.pdf